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Comments

1. Throughout the attached report read Sukhumi instead of Sukhva, Oczenchiri instead of Oczenchiri or Oczenchiri, Kochlavashvili instead of Kochvachvili.
2. The German scientists incompletely identified in the attached report are probably the following: Dr. Heinz Froehlich, Dr. Karl Bernhard, Kipl. Ing. Gerd Mueller, Dr. Hans Emil Lehmann, Dr. Herbert Reibedanz, Dr. Heinz Karl Moehr, Dr. Eberhard Steudel, Dr. Wilhelm Menke, Frau Elsa Suchland.

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REPORT NO.

25X1

Sinop Atomic Energy Institute Headed by Manfred von Ardenne

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EVALUATION

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STATE OF CONTENT

DATE OBTAINED

DATE PREPARED

24 June 1955

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REFERENCES

PAGE 5 ENCLOSURES (NO. &amp; TYPE) 2 Sketches, with legends on ditto

REMARKS

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Setup of the Institute

1. The Sinop Atomic Energy Institute was located near the Black Sea coast some 6 to 7 kilometers south of Sukhum, west of Sinop, and east of the double-track Sukhum - Ozenchiri railroad line and the Sukhum - Ozenchiri highway running parallel to the railroad line. The institute was allegedly called Institute A. Manfred von Ardenne was assigned as its German leader. General Kochvachvili (phonetic spelling) acted as Soviet chief. The institute was subordinated to the then IXth KVD Main Administration (now: 1st Administration) in Moscow.
2. The following German specialists were reported:

Chief of the institute:  
Department of Applied Physics:

Manfred von Ardenne  
Dr. Froehlich (fnu)  
Dr. Herbert Uerlings  
Dr. Bernhard (fnu)  
Dr. Mueller (fnu)  
Dr. Lehmann (fnu)  
Engineer Reibedanz  
Neurenter (fnu)

Chemical Department:

Professor Dr. Peter-Adolf Thyssen  
Dr. Moehr (fnu)

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In Moscow, the German specialists were lodged in the "House at the Lake" on Mozhaiski road located some 35 km southwest of Moscow.

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All scientific meetings and conferences took place in the Chaikovsky Reception Room at Sadova street.

#### Objectives at the Sincp Institute

Prior to 1950, work was concentrated on the following issues:

#### 7. Construction of an ultracentrifuge.

This task was performed by Dr. Steenbeck. His ultracentrifuge operated successfully and he was awarded a high bonus. The following data regarding his ultracentrifuge were reported:

diameter	590 mm <sup>1</sup>
scheduled rotational speed	100,000 r.p.m.
rotational speed reached	90,000 r.p.m.
separation factor attained	40-fold.

#### 8. Experimental work with the ultracentrifuge.

The ultracentrifuge was said to have operated satisfactorily, but no further details were offered. Source believed that the ultra-centrifuge offers unlimited possibilities and outranks all other isotope separation methods. The Pts Zawadill and Kafka assisted at the construction of the ultracentrifuge and in the experiments conducted with it.

#### 9. Construction of a van-de- Graff generator.

Although this task was assigned to him, Dr. Bernhard did not carry out this project.<sup>2</sup> Experiments were conducted by Ardenne and Bernhard with an old van-de-Graaf generator available at the institute and which served as a pattern for a new generator. No tangible results were obtained and Ardenne and Bernhard suffered severe burns as a result of careless handling of the apparatus.

#### 10. Magnetic isotopic separation.

Magnetic isotopic separation was performed by [redacted] Froehlich but this method was considered unsatisfactory. The available magnets including the large magnet from the former Reichspost Forschungsinstitute proved inadequate.

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#### 11. Separation by diaphragmatic diffusion was performed by Prof. Thyssen.

#### 12. A cyclotron was under construction but was not yet completed by the end of the period under observation. It was believed to be ready for operation in 1952.

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## 13. Magnetic isotopic separation.

Innumerable experiments led to satisfactory results, yet [redacted] there seems little to be gained in this way if compared with the achievements reached by the ultracentrifuge. Nevertheless [redacted] adequate results might be reached by using giant magnets.

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## 14. The following details were reported:

All work on magnetic isotopic separation was based on the Elin Magnet from the former Berlin-Miersdorf Reichspost-Forschungsinstitute. The circular poleshoes of this magnet were transformed to square shape in order to accommodate the separation chamber. This high-vacuum chamber which was to go into the magnet had brass walls 1,200 mm long, 800 mm wide and 30 mm thick. The lid and bottom of the chamber were 50 mm thick iron plates screwed onto the chamber. The chamber enclosed another smaller chamber called the "Monante". Although there was practically only active D, the name Monante was chosen in comparison with D<sub>1</sub> and D<sub>2</sub> of the cyclotron, the ion source being regarded as D<sub>1</sub>, the cover of the chamber being the imaginary D<sub>2</sub>. During the experiments, the monante was kept at varying distances from the outer chamber. Finally a 140 mm distance was found effective and was secured by porcelain insulating supports.

15. The ion [redacted] located below the monante consisted of a tungsten furnace 90 mm high and 20 mm in diameter encased in a 50 mm thick water-cooled copper jacket. After painstaking investigations, a 10 mm distance between the furnace and the copper jacket was found the appropriate distance to provide for the thermal expansion. The copper jacket was covered by an outer molybdenum sheet with an intermediate tungsten layer. The secondary ribbon-shaped cathode was located centrally above the furnace. The ionization cathode was located at the upper rim of the furnace with the ionization slit, the ionization space, and an arrangement of two molybdenum screens leading into the monante, the so-called Pierce optical system. The thorium oxide crucible holding 3 to 4 grams of pure uranium to be vaporized was located below the furnace. The support of this crucible was a major problem since the thorium oxide did not resist the furnace temperature of up to 2,300 degrees centigrade for more than a few hours and had then to be replaced. The crucible was enclosed in a radiation protection shell of an outer layer of molybdenum and an inner layer of tantalum. The most meticulous construction of the unit was imperative. The slightest tilting of the cathode could cause melting of the crucible, and the uranium flowing into the radiation protection shell would present serious hazards. The use of graphite crucibles was discontinued after some experimenting for being inadequate.

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Operation of the Magnetic Separation Unit

16. The cathode rays of 500 V/0.5 amp. intensity from the cathode above the furnace heated the uranium contained in the crucible, provided a constant temperature of the uranium, and stabilized the vapor pressure within the furnace. The ionization cathode which was kept at a lower temperature of 900 degrees centigrade prevented undesirable plasma oscillations.
17. The unit operated on a modified Pierce principle with three electrodes. The ion beam leaving the ion source at a 16 degree angle through the 4 mm wide ionization slit had a maximum radius of curvature of 450 mm and was collected by 35 kV. Attempts were made to diminish the dispersion of the ion beam through the 4 mm wide ionization slit to 2 mm width with the aid of ionization compensation through the Pierce system. The construction of the collector was the most difficult problem and continued to be unsatisfactory. Attempts to construct a brake-field collector ended in failure. By the end of the period under observation, the unit operated satisfactorily and the modified Pierce optical system provided trouble-free operation.

The Proton Source

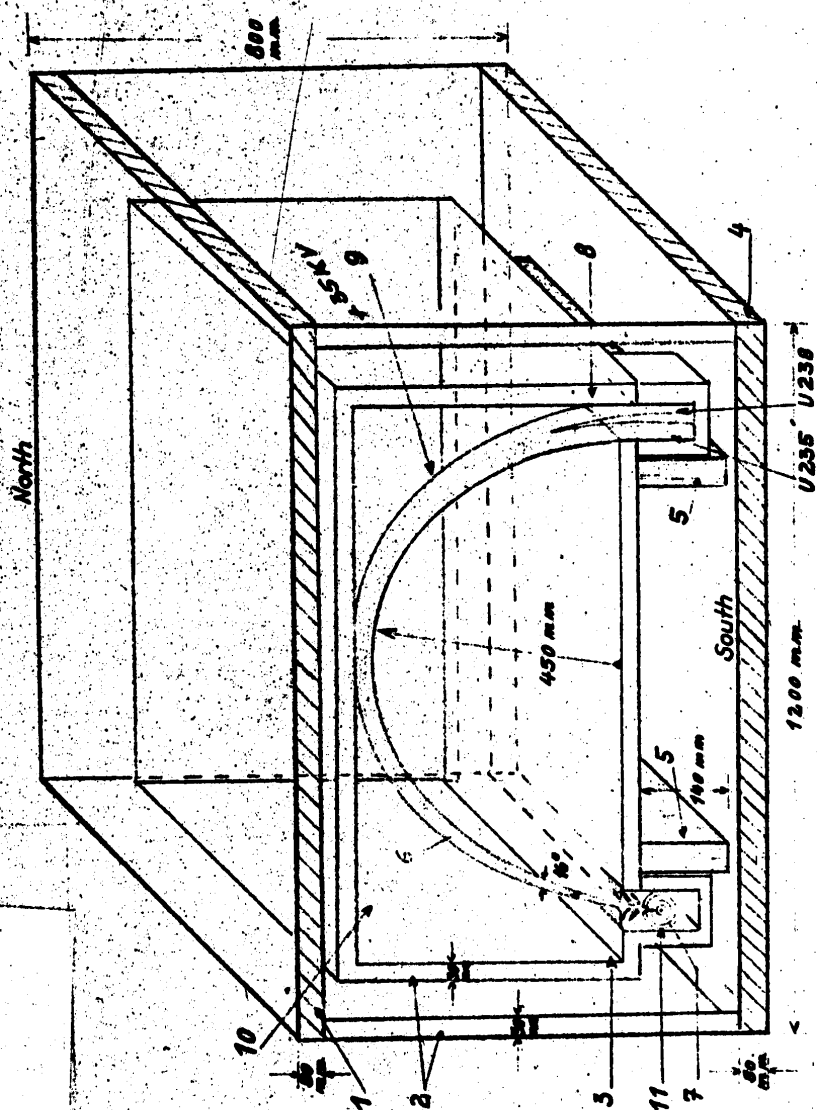
18. [redacted] Further details will be forthcoming.<sup>4</sup>
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Difficulties in the Materials Supply

19. Prior to 1948, tungsten sheets were imported [redacted] When these imports were stopped, work on uranium evaporation had to be suspended for 6 months. The situation was then relieved by illegal imports [redacted] No difficulties in the materials supply were noted in other fields.
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1. [redacted] Comment. The alleged 590 mm diameter of the ultracentrifuge is supposed to be a typographical error.
2. [redacted] Comment. Graduate engineer Bernhard (fnu) was to re-assemble a small van-de-Graaf generator dismantled in Berlin. This project was, however, suspended.
3. [redacted] Comment. For sketch of the separation chamber, see Annex 1.
4. [redacted] Comment. For schematic diagram of the proton source, see Annex 2.
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Diagram of the Separation Chamber



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annex 1

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Diagram of the Separation Chamber

Legend.

- 1 - Screwed-on iron plate 50 mm thick
- 2 - Brass walls of separation chamber and monante, approximately 30 mm thick
- 3 - Ion-source side of the separation chamber
- 4 - Screwed-on iron bottom plate, 50 mm thick
- 5 - Porcelain insulating supports 140 mm high
- 6 - Ion beam
- 7 - Tungsten case for furnace
- 8 - Collector side of the separation chamber
- 9 - Separation of ion beam
- 10 - "Monante" (inner chamber)
- 11 - Ion source

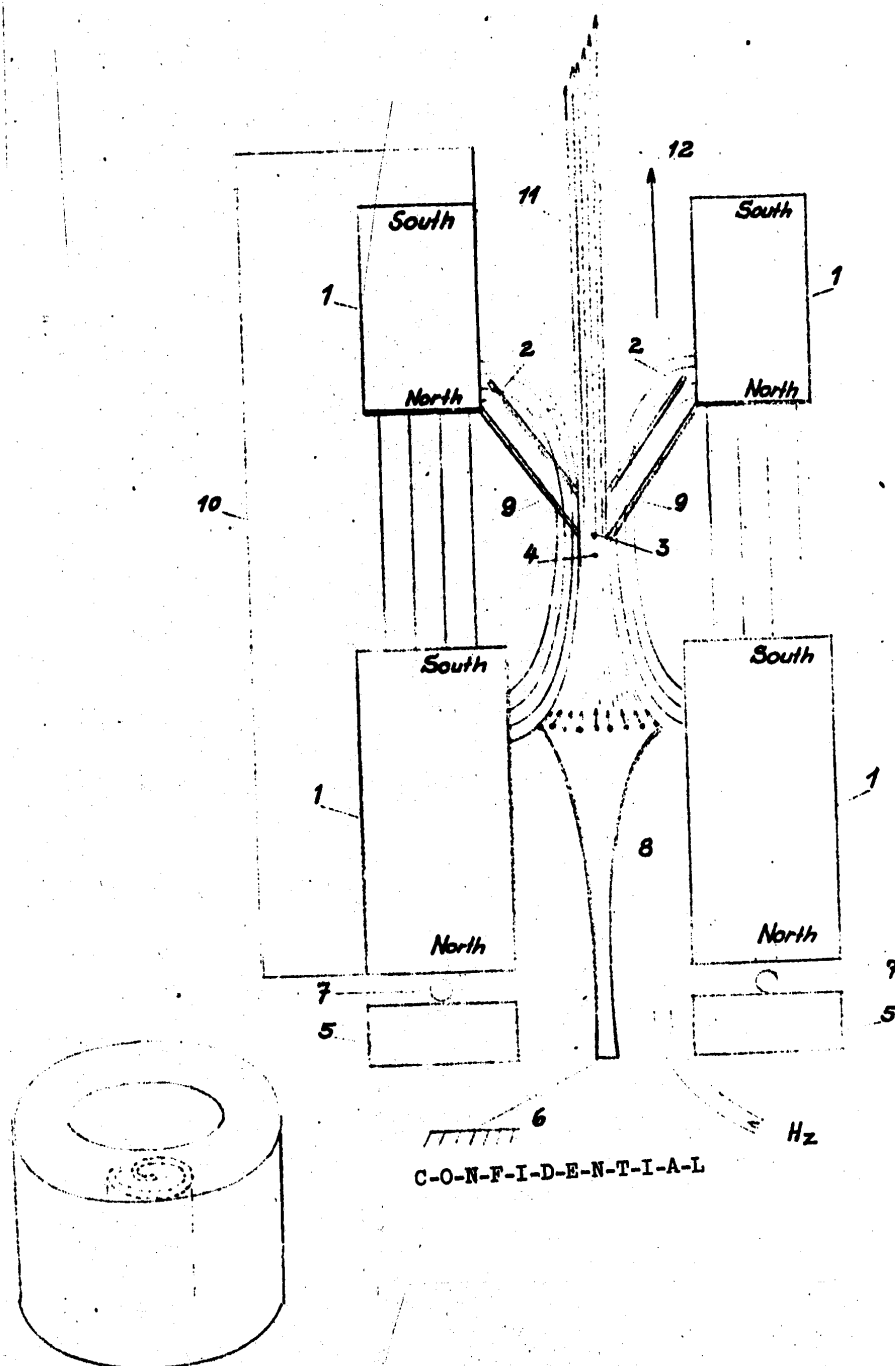
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Schematic Diagram of Proton Source



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Annex 2

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Schematic Diagram of Proton Source

Legend.

- 1 - Circular magnets
- 2 - 4,000-V collector electrode
- 3 - Plasma space
- 4 - Magnetically converged electron beam
- 5 - Tantalum sheet horns
- 6 - Ground potential
- 7 - Rubber insulation
- 8 - Equipotential cathode
- 9 - Cathode heating (80 V)
- 10 - Iron clip
- 11 - Deuterium ion beam
- 12 - Collector pump

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